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IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor	**Waldemar STEPHAN**
Patent App.	**09/388,813**
Filed	**1 September 1999** Conf. No. **4469**
For	**METHOD AND APPARATUS FOR CURRENT MEASUREMENT FOR ELECTRONICALLY-CONTROLLED PUMP**
Art Unit	**2829** Examiner **Nguyen, V**

Hon. Commissioner of Patents
Washington, DC 20231

Appealed 7-May-02

APPEAL BRIEF UNDER 37 CFR 1.192

Now comes appellant, by his duly appointed attorney, the undersigned, and respectfully submits his Appeal Brief under 37 CFR 1.192.

(1) REAL PARTY IN INTEREST

The real party in interest is Wilo GmbH, a limited liability company of Germany, located and doing business at Dortmund, Germany, assignee of the application by an assignment recorded 22 October 1999 at Reel 10336, Frame 101.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, the Appellant's legal representative or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) STATUS OF CLAIM

The original application contained claims 1 - 11. A claim 12 was added in an amendment filed 14 February 2001. Claims 1 - 11 have ben cancelled formally and replaced by new claims 13 - 23 in an amendment of 11 May 2001. Claims 13, 17 and 18 were amended in an amendment of 25 October 2001 which also cancelled claim 12 . Claims 13 - 23 are pending.

Claims 13 - 23 have been appealed.

(4) STATUS OF AMENDMENTS

No amendment has been filed subsequent to final rejection.

(5) SUMMARY OF THE INVENTION

The invention is a method of determining a current draw of a pump (3) driven by an electric motor (4) and having a motor control circuit (18 - 23) connected to the power line. The method (FIG. 4) involves measuring a voltage drop (e.g. via the microprocessor unit 37 in FIG. 4) across at least a portion (38) of a conductor in the form of a wire segment having a definite resistance and connecting the power line (31) with the motor control circuit (39) and calculating the current draw from the voltage drop.

From an apparatus point of view the invention is an electronically controlled pump assembly comprising an electric

motor 32 (see FIG. 4), having a power line connected thereto. The power line has been shown at 31 in FIG. 4 and arrives from the power source 30. The motor control circuit (39) connected to the motor and the power line has means (37) for measuring a voltage drop across at least a portion (38) of a conductor in the form of a wire segment having a definite resistance and connecting the power line with the motor control circuit and calculating the current draw from the voltage drop. A pump (33) is connected to the motor.

As will be apparent from page 2, lines 1 - 20, of the specification, it is not uncommon to provide a resistor as the electric component which serves as the current measuring component and to ensure the voltage drop across this component. The problem with the earlier systems has been the need for the measurement resistor as an extra component which must be provided at an additional cost and must be amounted on the circuit board by additional soldering steps. Special resistors and other increased cost, the problems of heating at the circuit board and the like all contribute to problems with could be avoided especially with continuously operating pumps which are often required to be of low cost.

The invention makes use of a segment of the usual line connecting the control circuit to the power line and which has a definite resistance. As pointed out at page 8, lines 1 - 9 between the plug contact and the printed circuit board a wire segment 13 is provided which can have a definite resistance and is used for the current measurement. This principle is also used in FIG. 3 where the power connector (14) has a power line (16) running to the motor

electronics (7) and a conductor segment 17a which can bridge the power section and the motor control section. The measurement resistance is here the segment 17a of the wire shown in broken lines in FIG. 3.

It will be demonstrated that the art does not disclose measuring a voltage drop across a wire segment 38 having a definite resistance (claim 13) or a system in which the measuring resistance "is a piece of current supply line connecting the power line with said motor-control circuit" as recited in claim 14.

It will be shown that the art does not disclose the use of a computing unit (37) for measuring the voltage drop and calculating the current draw from an input tapped across a wire segment as claimed (claim 15) or by converting a current measured in the portion of the conductor formed by that segment into a current draw of the pump (claim 16).

It will be demonstrated that the computer unit 37 forming part of the motor control circuit as recited in claim 17 is not in the art.

Appellant also believes that the features of claims 19 - 23 which define the resistance wire and the measurement circuit are not suggested either.

(6) ISSUES

All of the claims stand rejected with the exception of claims 15 and 17, which presumably are allowable, on WHIPPLE, III

under 35 USC 103 and the only issue in this case is whether any of the claims here have been properly rejected on WHIPPLE, III.

(7) GROUPING OF THE CLAIMS

Appellant believes that claims 13 and 18 can properly be grouped together and that the remaining claims 14 - 17 and 19 - 23 must be treated individually since a separate argument is made for the allowability of each of them.

(8) ARGUMENT

A. Introduction

Appellant believes that no claim in the present case can be properly rejected on WHIPPLE, III. Both claims 13 and 18 define the element across which the voltage drop is measured as a wire segment having a definite resistance. In Appellant's view WHIPPLE, JR. does not suggest or teach that the voltage drop should be measured across a wire segment as claimed and thus it is error to reject any claim in the case on WHIPPLE, JR.

The Examiner cannot simply disregard the claimed invention and especially the point emphasized by Appellant, merely because he cannot fit the reference into the claim. The reference discloses a current sensor 200 and says, about the current sensor "To measure the magnitude of the <u>difference in phase angle</u>, device 10 comprises a sensor <u>for detecting at least one zero current</u> point in the alternating current of load 100.(col. 3, lines 15 - 18)".

At col. 3, the reference states "sensor 200 senses a corresponding zero current point in the alternating current of load 100." (col. 3, line 68 - col. 4, line 2).

At col. 4, lines 3ff, the reference states "Sensor 200 provides a signal, such as a voltage signal, at output 210 corresponding to the sensed zero current point in the alternating current of load 100. Depending upon the particular embodiment of sensor 200 the signal at output 210 may take any one of a number of forms. For example, as illustrated in FIGS. 10(b) and 10(c), a voltage signal such as shown in FIG. 10(b) and provided at output 210, may take the form of a square wave transitioning between a voltage amplitude Vcc and ground at each zero current point, or it may take the form of a series of voltage spikes, each occurring at a zero current point, as shown in FIG. 10(c)."

At col. 4, lines 43 ff it is stated "In an alternative embodiment, device 10 illustrated in FIG. 1 may comprise sensors 200 and 400 in which the signals provided at outputs 410 and 210 respectively comprise voltage square wave signals as previously described."

At col. 4, lines 61 ff the reference states "Likewise sensor 200 may provide a voltage signal at output 210 comprising a voltage square wave transitioning to ground at the zero current point in which the alternating current of load 100 is increasing and transitioning to a positive voltage at a succeeding zero current point in which the alternating current of load 100 is decreasing."

Indeed, similar discussions of the current sensor are repeated throughout the patent and in the claims.

The voltage sensor 400 is described at col. 3, lines 21 ff as follows: "Device 10 further comprises a sensor 400 for detecting the zero voltage point in the alternating voltage of load 100 that is least remote in time from the zero current point detected by sensor 200."

At col. 3, lines 38ff the following is stated with respect to the voltage sensor. "Sensor 400 senses at lest one zero voltage point of the alternating voltage of load 100, and provides a signal at output 410 which may take any one of a number of forms, such as, for example, a square wave voltage varying between two voltage levels, such as a voltage level Vcc and ground, with transitioning occurring when sensor 400 senses a zero voltage point."

Throughout the text of the patent the voltage sensor has been described in analogous terms. Neither this voltage sensor 400 nor this current sensor is a wire segment as claimed nor is either a means for measuring a voltage drop across a wire segment or for calculating the current draw from the wire segment.

The specific limitations pointed to in the rejected claims are not met or suggested by WHIPPLE, III.

B. Applicant respectfully assigns error in the rejection of claim 13 and claim 18 in that WHIPPLE, III cannot be read as measuring a voltage drop across a wire segment as opposed to a

separate resistor and thus the rejection of claims 13 and 18 cannot stand.

C. The WHIPPLE, III reference does not teach or suggest that the wire segment across which the voltage is measured, is a piece of current supply line connecting the power line with a motor control circuit as required by claim 14 and thus the rejection of claim 14 cannot stand.

D. WHIPPLE, III does not suggest that the voltage drop can be measured and the current draw calculated across the wire segment by a computer unit forming part of a motor control circuit and hence the rejection of claim 15 cannot stand.

E. The WHIPPLE, III reference does not disclose converting current through a wire segment as recited into a value of the current draw of the pump and thus the rejection of claim 16 cannot stand.

F. The WHIPPLE, III reference does not disclose a temperature regulating circuit in conjunction with the voltage detection across the wire segment and thus the rejection of claim 17 cannot stand.

The WHIPPLE, III reference does not measure the voltage drop across a piece of resistance wire with a known specific

resistance and defined length and thus the rejection of claim 19 cannot stand.

G. The WHIPPLE, III reference doe snot disclose any of the structure of claim 20 in combination with a wire segment across which the voltage is measured and the rejection of claim 20 cannot stand.

H. The WHIPPLE, III reference does not disclose a wire segment with a resistance between 1 and 5 millions and thus the rejection of claim 21 cannot stand.

I. The WHIPPLE, III reference does not disclose the processors required in claims 22 and 23 and therefore the rejection of these claims cannot stand.

(9) CONCLUSION

Since the sole reference which has been applied by the Examiner does not suggest the structure or features of any of the claims in the case, the final rejection must be reversed as to all claims.

An appendix containing a copy of the claims involved in the appeal is attached hereto.

This brief is submitted in triplicate.

A charge form applying the brief fee to a charge card of the undersigned is enclosed. Any fee not covered by such charge authorization should be applied to the Deposit Account 18-2025 of the undersigned.

Respectfully submitted,
The Firm of Karl F. Ross P.C.

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Enc: Appendix
Appeal Brief in triplicate
Charge Form (PTO 2038)

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APPENDIX

Claims 13 - 23.

13. A method of determining a current draw of a pump driven by an electric motor having a power line and a motor-control circuit connected to said power line, said method comprising the steps of:

(a) measuring a voltage drop across at least a portion of a conductor having a definite resistance and connecting said power line with said motor-control circuit; and

(b) calculating said current draw from said voltage drop.

14. The method defined in claim 13 wherein said portion of said conductor having said resistance is a piece of current supply line connecting the power line with said motor-control circuit.

15. The method defined in claim 13 wherein the voltage drop is measured and the current draw is calculated from said voltage drop by a computing unit forming part of said motor-control circuit.

16. The method defined in claim 13 wherein a current measured in said portion of said conductor is converted into a current draw of said pump.

17. The method defined in claim 13 wherein in calculating said current draw from said voltage drop, a computer unit forming part of said motor control circuit effects effects a regulatory action in response to a temperature of said portion of said conductor.

18. An electronically controlled pump assembly especially comprising:

an electric motor having a power line connected thereto for energizing said electric motor;

a motor control circuit connected to said motor and said power line for electronically controlling said pump assembly;

a pump driven by said motor; and

means for measuring a voltage drop across at least a portion of a conductor having a definite resistance and connecting said power line with said motor control circuit and calculating said current draw from said voltage drop.

19. The assembly defined in claim 18 wherein said portion of said conductor is a piece of resistance wire with a known specific resistance and a defined length.

20. The assembly defined in claim 18 wherein said portion of said conductor is a bridge between a plug contact to which said power line is connected and a printed circuit board carrying said motor control circuit, said bridge having a defined resistance.

21. The assembly defined in claim 18 wherein said resistance is between 1 and 5 mΩ.

22. The assembly defined in claim 18, further comprising a processor forming part of said motor control circuit and constituting the means for measuring and calculating.

23. The assembly defined in claim 22 wherein said processor is provided to effect a regulatory action in response to the temperature of said portion of said conductor.